SPECTRUM®

Path view
User's Guide

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Preface

The Application Guide for PathView serves as a reference guide to PathView application software. You can read this manual if you want to construct and view a graphic representation of SPECTRUM's router path. Initially, you should be familiar with SPECTRUM's functions as described in the SPECTRUM System User's Guide and the SPECTRUM System Administrator's Guide.

How This Manual Is Organized

This manual is organized as follows:

Chapter	Description
Chapter 1 Introduction to PathView	This chapter provides general information about the PathView Management Module, its operation, and options.
Chapter 2 Using PathView	This chapter provides a description of the PathView Control View and the PathView discovery View. Conventions for accessing the views are also discussed.
Chapter 3 Sample PathView Sessions	This chapter outlines the starting, or launching, procedure for four sample PathView sessions.

Conventions

In this manual, the following conventions are used:

- Command names are printed in **bold**; for example, **Clear** or **Save & Close**.
- Menu selections to access views are printed in **bold**; for example, **Configuration**.
- Buttons are represented by a shadowed box; for example:

Help

- Book or chapter titles are printed in *italics*; for example, *SPECTRUM Operator's Reference.*

Related SPECTRUM Documentation

Refer to the following documentation for more information on using SPECTRUM:

SPECTRUM Operator's Reference

SPECTRUM Administrator's Reference

SPECTRUM Report Generator User's Guide

SPECTRUM Application View Reference

Getting Started with SPECTRUM for Operators

Getting Started with SPECTRUM for Administrators

How to Manage Your Network with SPECTRUM

Other Related Documentation

Refer to the following documentation for more information on managing TCP/IP-based networks:

LAN Troubleshooting Handbook, Mark Miller (1989, M&T Publishing, Inc.) 2nd Edition, 1993

The Simple Book — An Introduction to Management of TCP/IP-based Internets, Marshall T. Rose, Performance Systems International, Inc., 2nd Edition, 1994

Computer Networks, Andrew S. Tanenbaum, Prentice-Hall, Inc.

Local Area Networks Architectures and Implementations, James Martin & Kathleen K. Chapman or the Arben Group, Inc. (1989, Prentice-Hall, Inc.)

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Chapter 1

Introduction to PathView

This chapter describes SPECTRUM's PathView application. PathView is a graphical application which operates in conjunction with SPECTRUM to discover and display the path between two devices in the network.

General Information

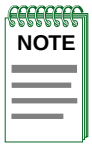
PathView provides a visual representation of data packet routing patterns within your network, and can be useful in diagnosing network problems. Once you supply PathView with valid source and destination devices, the application graphically displays the path from the source to the destination, showing each router discovered along the path. Hubs, bridges, and other devices connecting routers in the path also appear. Currently, the PathView application is configured to discover paths in TCP/IP networks; future releases may provide discovery capabilities using other network types.

Starting PathView

The PathView application can be started from the following:

- any existing SPECTRUM view
- SPECTRUM Utilities menu
- SPECTRUM View menu

The application initially displays a window allowing you to specify the input parameters for PathView, such as source or destination addresses and path display options. Once you select the desired input parameters, the application displays a SPECTRUM view showing the path as it is being discovered. This view displays each device along the discovered path, allowing you to access and query devices using SPECTRUM device icons.



You may view multiple PathView applications concurrently by double-clicking on the File Menu? selection twice. This opens two PathView Control View windows; you can initiate PathView discovery on one path within each window.

Incorrectly Modeled Networks

It is recommended that the network topology be correctly modeled by SPECTRUM for PathView to properly find the path between devices. This is accomplished by using the SPECTRUM AutoDiscovery tool. PathView shows the connections between routers and devices between the routers if the network is correctly modeled; additional information can be provided about port connections between each device and the next device along the path.

PathView may locate and display routers between the source and destination from an incorrectly modeled network topology, but may not show hubs, bridges, or other devices between the routers. Additionally, device port information may not appear, and PathView may not discover the path between the specified source and destination due to inconsistent support for IP (Internet Protocol) options among routers in existing networks.

PathView Operation

PathView attempts to “discover” path devices in two phases, as described in Table 1-1.

Table 1-1. PathView Discovery Phases

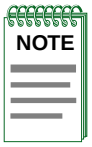
Phase	Discovery Type
Phase 1	Router Discovery
Phase 2	SPECTRUM Topology Discovery

The following sections cover the mechanics and interdependencies of each path discovery phase.

Router Discovery

During Phase 1 discovery, PathView attempts to locate each router along the path between the source and destination, using the same IP packet routing data. PathView utilizes the Simple Network Management Protocol (SNMP) and the IP/ICMP (Internet Control Message Protocols) to discover each successive router in the path. Each router in the path is sometimes referred to as a "hop". The discovery process is designed to successively find the next hop until the destination is reached.

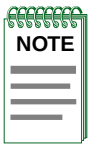
SNMP is the preferred protocol for discovering the routers, because the device's routing tables can be read directly, and also because PathView obtains information about the router's ports that are used in the path.



SNMP discovery is used for routers modeled in SPECTRUM.

The Phase 1, or "live", method of path discovery utilizes the SNMP and IP/ICMP network protocols to discover routers on the path. PathView initially uses the SNMP protocol to discover the router path. Phase 1 does not attempt to discover hubs, bridges, or other intra-router devices in the network.

If SNMP discovery fails to find the next hop, PathView uses the IP/ICMP protocols to attempt to discover the next hop. This method is less reliable than SNMP discovery; it utilizes the Loose Source Routing option for IP packets, and some routers do not implement this option.



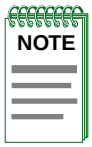
The polling time during the IP discovery phase is network dependent, and may cause slight delays in the discovery process.

Reasons for Phase 1 router discovery failure are as follows:

- Invalid source or destination address is specified
- Source and destination are not connected on the network
- One or more intermediary routers are not modeled in SPECTRUM and do not correctly implement the IC/ICMP protocols

SPECTRUM Topology Discovery

During Phase 2, PathView uses the network topology information found in SPECTRUM to discover devices between routers discovered in Phase 1.



Phase 2 discovery is optional; you may disable Phase 2 prior to initiating the discovery process.

If Phase 1 router discovery fails, the SPECTRUM topology phase attempts to find the routers and the inter-router devices from the source or last known router on the destination path. Reasons for Phase 2 SPECTRUM topology discovery failure are as follows:

- The Local or Remote VNM is not configured
- The network is reconfigured while PathView is running
- The network is incorrectly or incompletely modeled in SPECTRUM

Source and Destination Addresses

You must supply valid source and destination network addresses for PathView to function. The source and destination are typically hosts or routers within your network; any device with a valid network address may be selected. Each network address is input as a complete address; you may enter the address by using one of the following choices:

- Type the IP address directly into the address field (if known)
- Select a model from the SPECTRUM clipboard
- Find SPECTRUM models by model name or model type name
- Start pathview from a selected model within a SPECTRUM View

You may select one of the previous choices; the device IP address is obtained from the “AGENT-ID” attribute of the selected model.

PathView Options

The PathView user interface allows you to control/set the following options:

- **Discover** (Discovery type) - select Full Path or Routers Only to view all devices or routers on the path
- **Path type** -select Model Type mode to view the path by model, or select IP mode to view path by IP address
- **Layout** - select linear or compact mode to show the path
- **Show Ports** - activate Show Ports to display device port information not otherwise provided

Chapter 2

Using PathView

This chapter describes the PathView user interface and explains the views created by PathView.

The two main view components in the user interface for the PathView application are the PathView Control View and the PathView Discovery View. The PathView application initially displays the SPECTRUM PathView Control View, as shown in Figure 2-1. You can enter source and destination addresses, and configure the output display options.

Once the necessary input parameters are specified, you can select the **OK** button to start the discovery process. The PathView Discovery View appears, displaying the router path and devices.

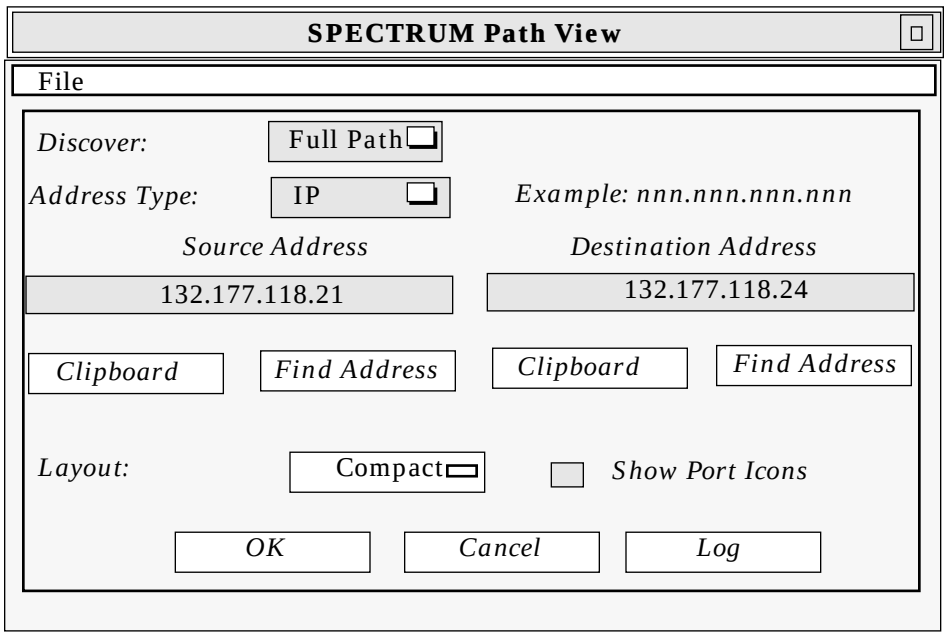
PathView Control View Fields

Figure 2-1 shows the SPECTRUM Path Control View. The Control View fields are described in the following sections.

Additional PathView information or views that can be accessed by using the following conventions:

- Pull-down menu choices
- Buttons/text entry fields
- Toggle switches

Figure 2-1. PathView Control View and Fields



Pull Down Menu Choices

The PathView Control View provides access to the functional groups listed below:

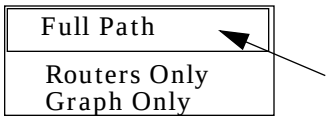
- Discover
- Address Type
- Layout

Each group provides a pull down menu with two or more choices. These choices are described below.

Discover

The Discover toggle provides a pull-down menu with three choices: **Full Path, Routers Only**, and **GRAPH Only**. These menu choices are described in the following sections. Figure 2-2 provides an example of the Discover pull-down menu, accessed from the PathView Control View.

Figure 2-2. Pull-down Menu for the Discover Function



Full Path

Select **Full Path** to initiate full discovery of routers on the path and devices between the routers. This causes both phases of discovery to be utilized. **Full Path** is the default value.

Routers Only

Select **Routers Only** to discover devices acting as routers on the path. Phase 2 topology discovery does not occur when **Routers Only** is selected.

GRAPH Only

Select **GRAPH Only** to display previously created models on the path. Other routers or devices that SPECTRUM discovers on the path between the Source and Destination Addresses do not appear. Phase 2 Live Router discovery does not occur when **GRAPH Only** is selected.

Address Type

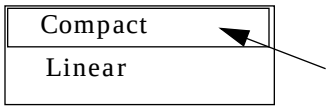
This toggle switch allows you to select either IP or Model Name. The IP choice allows you to view the Source and Destination Addresses by the complete IP address; Model Name allows you to view the addresses by model type or device name. The Address Type field currently defaults to IP. Figure 2-3 provides an example of the address type pull-down menu, accessed from the PathView Control View.

Figure 2-3. Pull-down Menu for the Address Type Function

Layout

The Layout toggle offers two options: **Compact** and **Linear**. Layout mode can be changed before or after discovery of the path. Figure 2-4 shows a pull-down menu for the layout function.

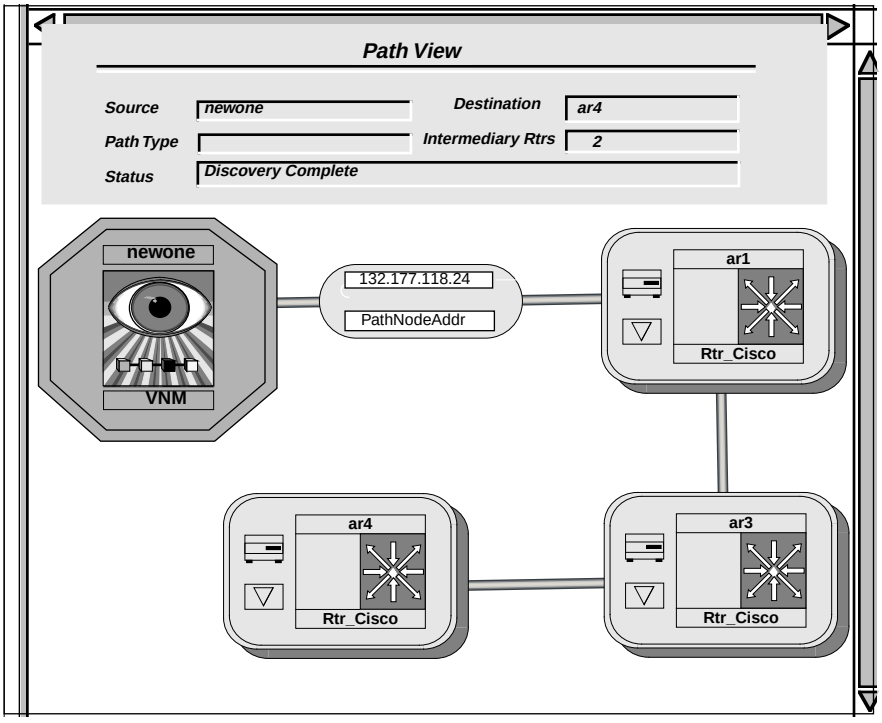
Figure 2-4. Pull-down Menu for the Layout Function



Compact

The default Compact Mode option wraps the router path around, moving from left towards the right, down, and left again. This option attempts to keep the path displayed in a compact-style fashion, and utilizes as many rows as necessary to show the full router path. Figure 2-5 illustrates a sample Compact Router Path with Show Port Icons disabled.

Figure 2-5. Compact Mode Router Path with Show Port Icons Button Disabled



NOTE

If you choose Compact Mode, the ports are listed in a first in-port then out-port basis, on odd rows. Even rows exhibit ports in an out-port then in-port order.

Linear

The Linear Mode option provides a straight line representation of PathView routers and devices, the path moving from left to right.

NOTE

Discovered paths with 4 or less devices appear in linear mode.

Figure 2-6 illustrates a sample router path in Linear Mode with the Show Port Icon function disabled.

Figure 2-6. VNM Router Path in Linear Mode With Show Port Icons Disabled

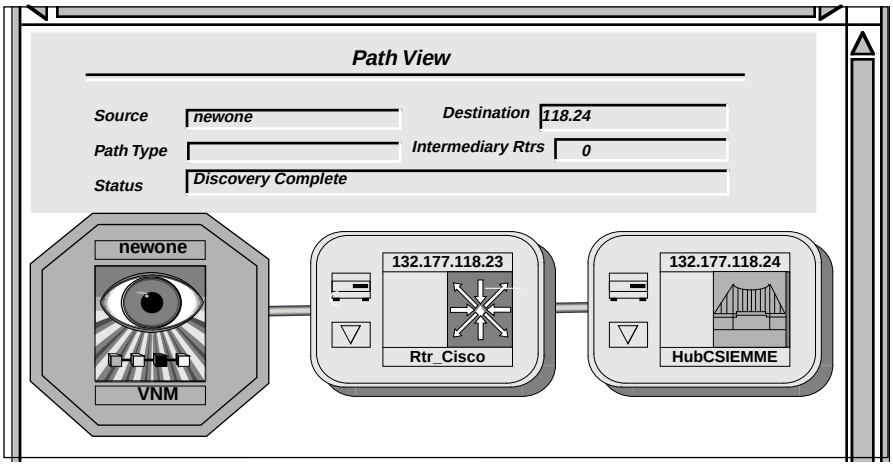
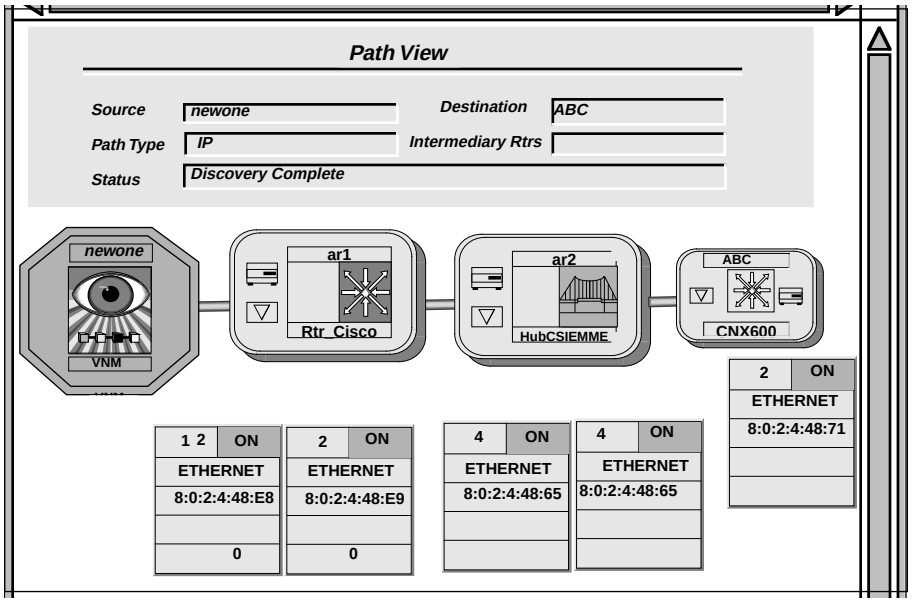


Figure 2-7 shows a router path in Linear Mode with Show Port Icons enabled.

Figure 2-7. VNM Router Path in Linear Mode with Show Port Icons Enabled



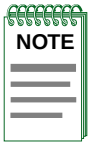
Buttons/Text Entry Fields

The following sections describe the buttons and text entry fields used in the PathView Control View.

Clipboard

The Clipboard button function allows you to select a source or destination address or model name from models in other SPECTRUM views. This is accomplished by copying one or more device icons from the clipboard buffer in SPECTRUM into PathView. To select a source or destination from another SPECTRUM view, follow these steps:

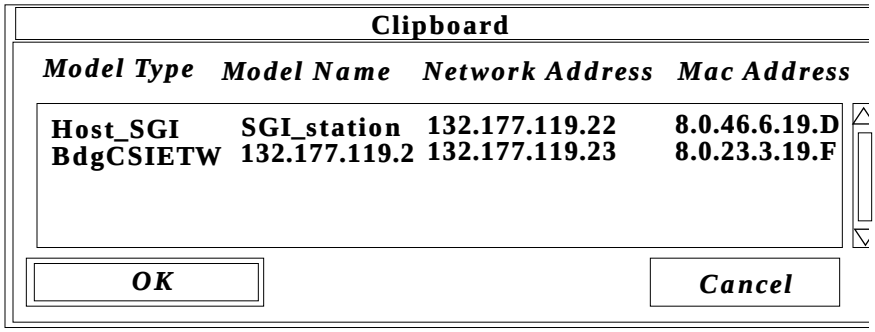
1. Highlight one or more icons in the SPECTRUM view by holding the keyboard shift button and selecting one icon at a time.
2. In Edit mode, copy the icon(s) into the clipboard buffer.



Each time you copy any icon(s) into the Clipboard buffer, you overwrite the previous icons saved in the Clipboard buffer.

3. Click the clipboard button under either the Source or Destination Address text entry fields. If only 1 model is copied to the clipboard, its address automatically becomes inserted into the address field. If multiple models are copied into the clipboard, a list box is displayed showing all of the selected models. Figure 2-8 shows an example of the PathView clipboard's contents.

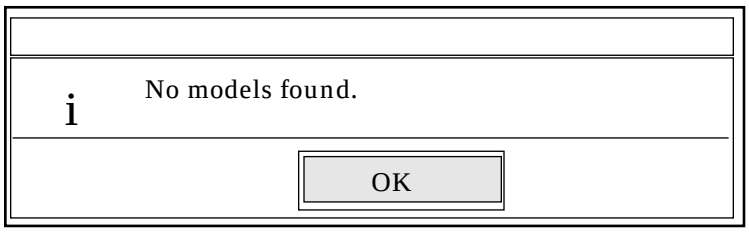
Figure 2-8. PathView Clipboard



4. Select a model (showing model type, name, and network/Mac addresses of a device) from the list box to be used as the Source or Destination Address. Click **OK**.

If you click the clipboard and the **No Models Found** dialog box appears, follow these steps again. Figure 2-9 provides an example of a No Models Found dialog box.

Figure 2-9. No Models Found Dialog Box



You may cancel out of PathView at any time without affecting the outcome of your SPECTRUM session.

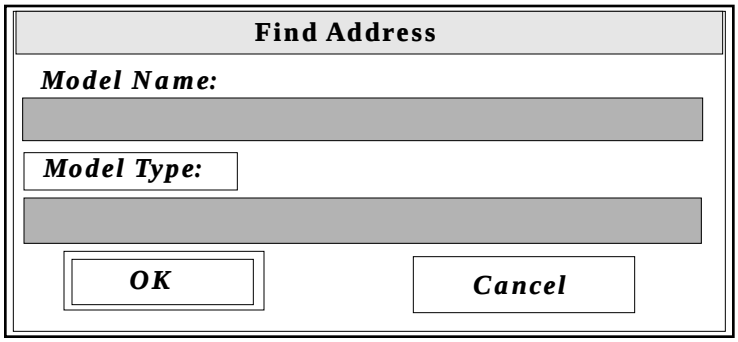
Find Address

Find Address allows you to select a SPECTRUM model as the source or destination by either specifying a known model name or by selecting from a list of models of a known model type name.

The following information describes the procedure for selecting and implementing source and destination addresses in PathView.

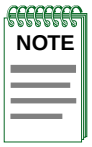
1. Click the **Find Address** buttons under either the Source or Destination Address text entry fields. A **Find Address** dialog box appears with fields requesting Model Name and Model Type (shown in Figure 2-10).

Figure 2-10. Find Address Dialog Box



2. Enter the requested information into the Source and Destination Address text entry fields.

You may enter a model or a model type name. If both fields are completed, PathView uses the model name to find the address from the SPECTRUM database. If you do not know the model type name to use, you can click the model type button, and a list box displays all model types. You can select a model type to be entered into the model type name field.



The filter field is used to match the list of model type names to the specified filter string.

3. Click **OK** to view the selected model information.

4. You may cancel out of the **Find Address** process at any time by clicking the Cancel button. The outcome of your SPECTRUM session is not affected by this action.

If no matching model or model type names show, a message stating “No source address found” displays. You may type another IP address, use the Clipboard function, or use the **Find Address** function again to find the desired address.

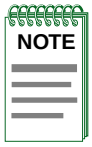
OK

Clicking the **OK** button initiates the discovery process for path routers and/or devices. Click after a Source Address and Destination Address has been added to the appropriate fields. You can edit the source and destination addresses in any of the described methods prior to clicking the **OK** button. Once the **OK** button is selected, the Source Address and Destination can not be changed.

Cancel

Click this button to cancel the current PathView Display View.

The PathView Display View is closed separately from the PathView Control View (by clicking the **OK** button).

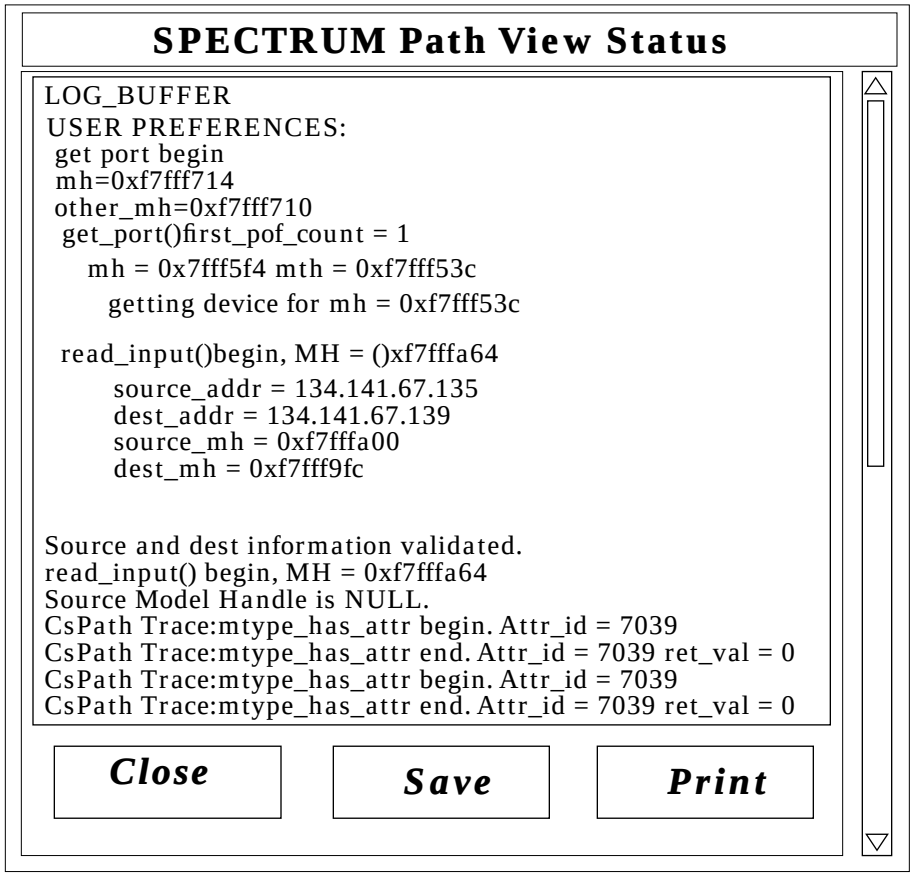


You may terminate the PathView session by simply closing the PathView Display View at any time. This action stops PathView discovery and releases all resources being used by the PathView session.

Log

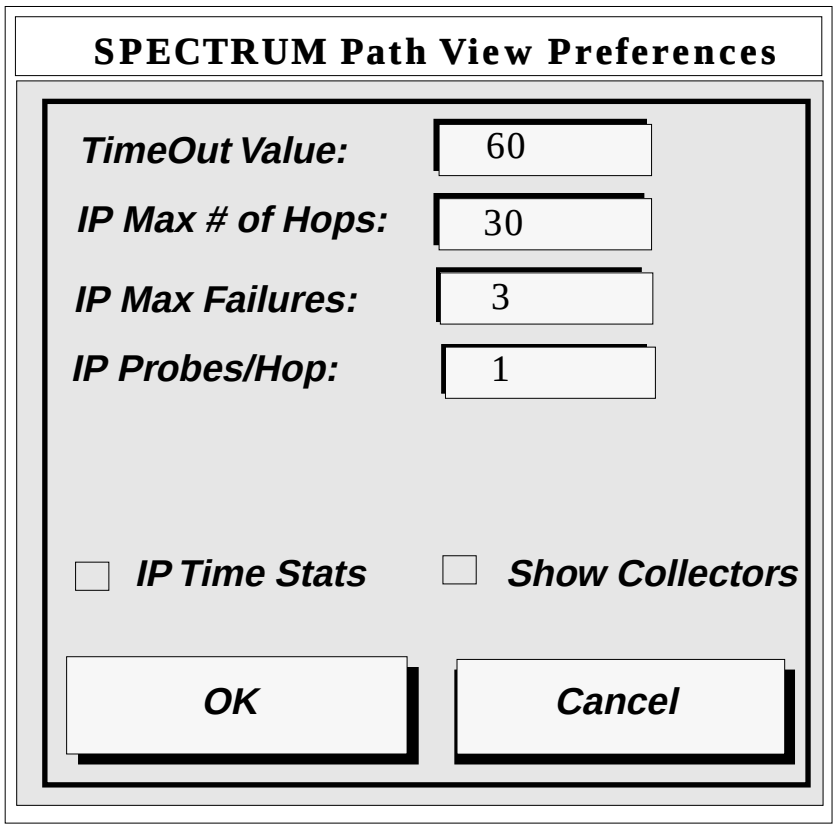
Click on this button to display the log window with information being generated by the discovery process. You can **Close**, **Save**, or **Print** this information to a printer or UNIX file by using the appropriate view button.

Figure 2-11. Path View Status Window



If the Log button is grayed out, you can open the PathView File menu and select **View Trace Log**, which also allows access to the Preferences Window. Figure 2-12 describes this window and its statistics.

Figure 2-12. PathView Preferences Window



Time Out Value

This field displays the value PathView allows in seconds before concluding that there is no response. PathView considers this action as a failure and considers the next router. The default for TimeOut Value is 60 seconds; the value ranges between 1 and 60.

IP Max # of Hops

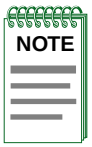
This field displays the maximum number of devices acting as routers discovered in the path between source and destination addresses. The default for IP Max # or Hops is 30; this value ranges between 1-60.

IP Max Failures

The IP Max Failures field represents the number of consecutive failures for the packet TTL (Time to Live) rate before the router discovery process cancels. The maximum number of failures ranges between 1-10.

IP Probes/Hop

This field displays the number of packets sent out from a router in an attempt to find the next device on the path.



The IP Stats and Show Collectors fields are currently inoperable in PathView; each grayed out field accompanies a button.

OK

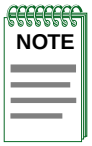
Clicking on this button saves your changes and returns you to the PathView Control View. You can now open the File menu and select View Trace Log.

Cancel

Clicking on this button cancels any changes to statistics made during this editing session. This log record defaults to the last series of changes saved. This action returns you to the PathView Control View.

Show Port Icon (Toggle Switch)

You may display the device port icons by toggling this switch on or off. The Show Port Icons default position is "**On**", to show the port icons.



*After the path has been discovered and the path view is displayed, you can click the **Show Port Icons** button to change the display status of the device port icons.*

PathView Discovery View

Once you have clicked **OK**, the PathView Discovery View appears, with the following informational fields:

PathView Status Box

The PathView status box shows the status of the discovery process during discovery and after its completion.

Status Box Fields

Status box fields are described below:

Source

This field shows the machine name, source name, or IP address of the source.

Destination

This field shows the machine's name, source name, or IP address of the destination.

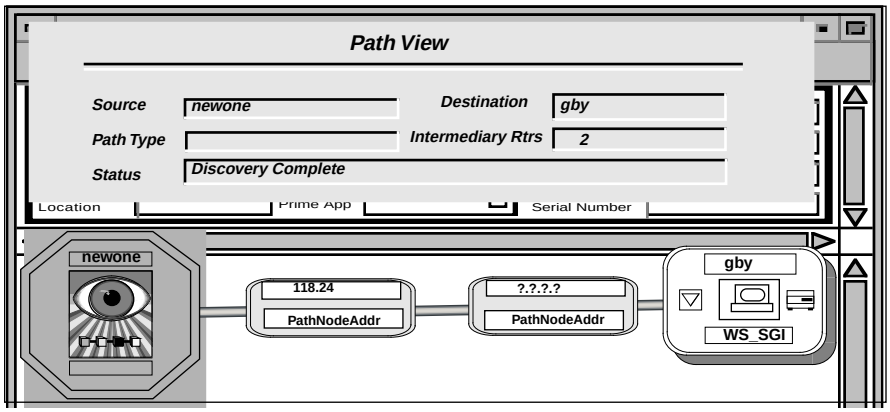
Path Type

This field shows the path type. Currently only the IP path displays; **Path Type** defaults to IP.

Intermediary Rtrs

This field shows the number of valid discoverable intermediary routers found during Phase 1 of the discovery process. Figure 2-13 displays an unknown router displaying in the path, after discovery is complete.

Figure 2-13. Path with a PathNodeAddr Model and an Unknown Router



Status

This field displays the progress or status of the discovery process. Possible status values are as follows:

- Finding routers
- Finding intra-router devices
- Finding path using SPECTRUM DB
- Discovery complete
- Discovery Failed
- Failed: incomplete source information
- Failed: incomplete destination information

This view displays the path as it is being discovered. If PathView discovery fails, it shows port statistics up to the point of failure. You can click the Path Trace log button from the Control View to access failure information.

NOTE

It is important that SPECTRUM relations are correctly set up before you initiate PathView discovery; otherwise, discovery may fail. Refer to the SPECTRUM System Administrator's Guide *for information.*

Discovery FAILED

The Discovery FAILED dialog box warns you of PathView's inability to discover the router path. Click **OK** to exit the discovery process.

Discovery FAILED

Chapter 3

Sample PathView Session

This chapter provides three sample sessions for PathView. The following sections describe the procedure for launching three different PathView sessions.

Sample PathView Session

You can view a router path between your workstation or PC in one area and a node in another area. Depending upon the choice of options previously discussed, you can model different router paths.

Figure 3-1 shows routers ar1 - ar6 and two LANs. Three sample PathView sessions are run from the Topology View modeled network. Figure 3-2, Figure 3-3, and Figure 3-4 represent the sample PathView sessions.

Full Discovery in Linear Layout/Show Port Icons On

Figure 3-1 shows a Full Path router path showing all routers and devices on a router path, displaying in Linear Layout with Show Port Icons off.

Figure 3-1. Full Path Router Path in Linear Layout with Show Port Icons Off

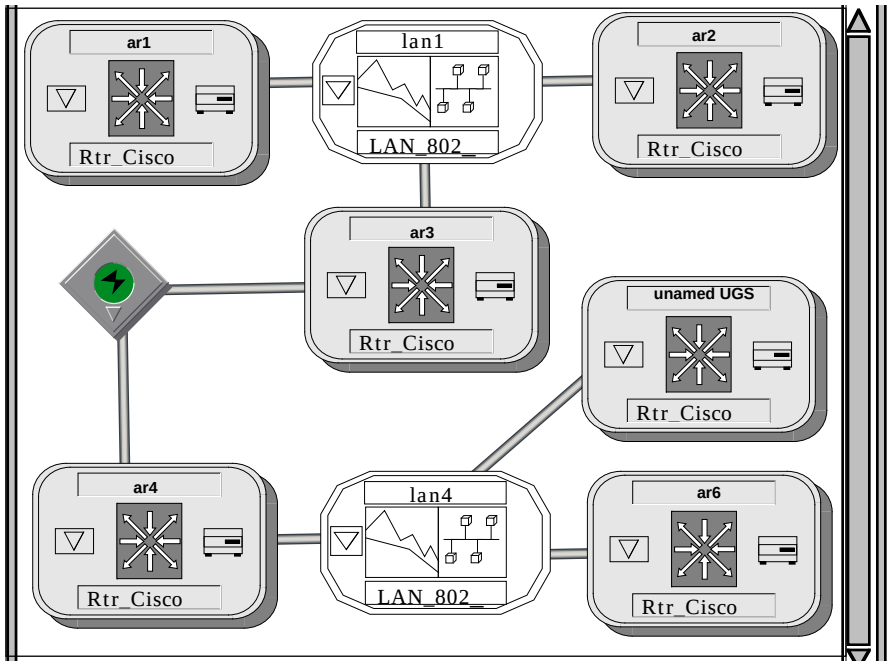


Figure 3-2. Full Path Router Path in Linear Layout with Show Port Icons On

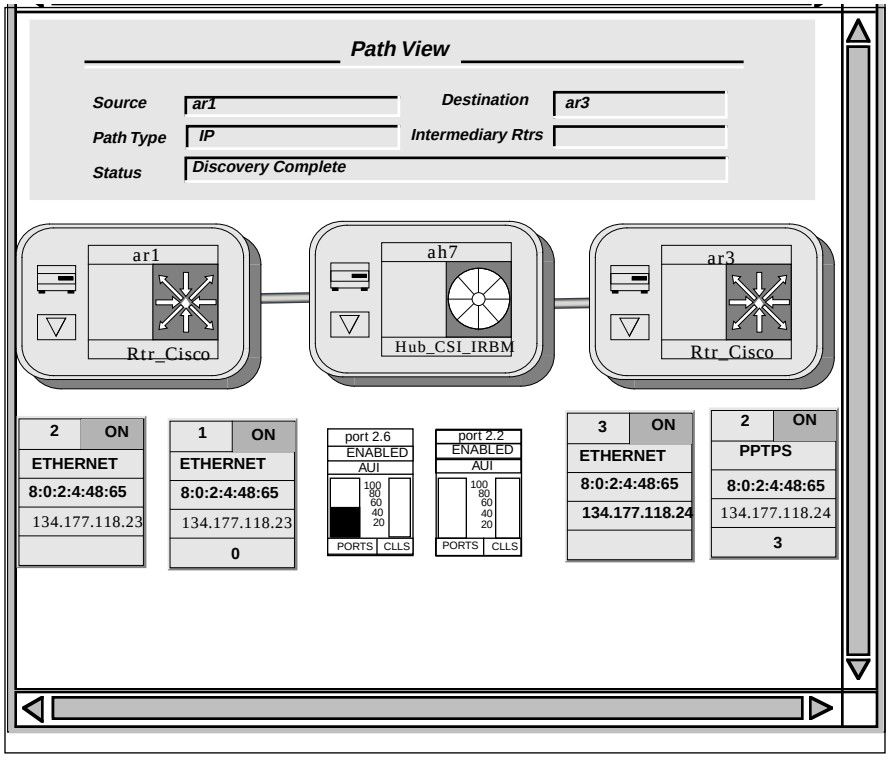


Figure 3-2 shows the path between sample routers ar1 and ar3, and illustrates the path launched from a model including its source address. The destination address is obtained from the clipboard. You should follow these steps to display a similar Full Path router path.

1. Click the middle mouse button on the first router (sample router ar1) to display the Icon Subviews menu.
2. From the View menu, select Utilities.
3. Select **PathView** from the Utilities menu, to launch the PathView application. The SPECTRUM PathView Control View appears displaying the address for the first router (ar1), entered in the Source Address field.
4. In **Edit** mode, click on a router model (sample router ar3).
5. **Copy** the model to the clipboard. A Confirm message box appears.
6. Click **OK** at the “This will overwrite the buffer” prompt.

7. Click the Destination Address Clipboard button. The clipboard contains one model (ar3) for this sample router path; you may select other models to copy to the clipboard.
8. Set the Layout choice box value to "Linear" for linear display.
9. Click **OK** to start the path discovery process.

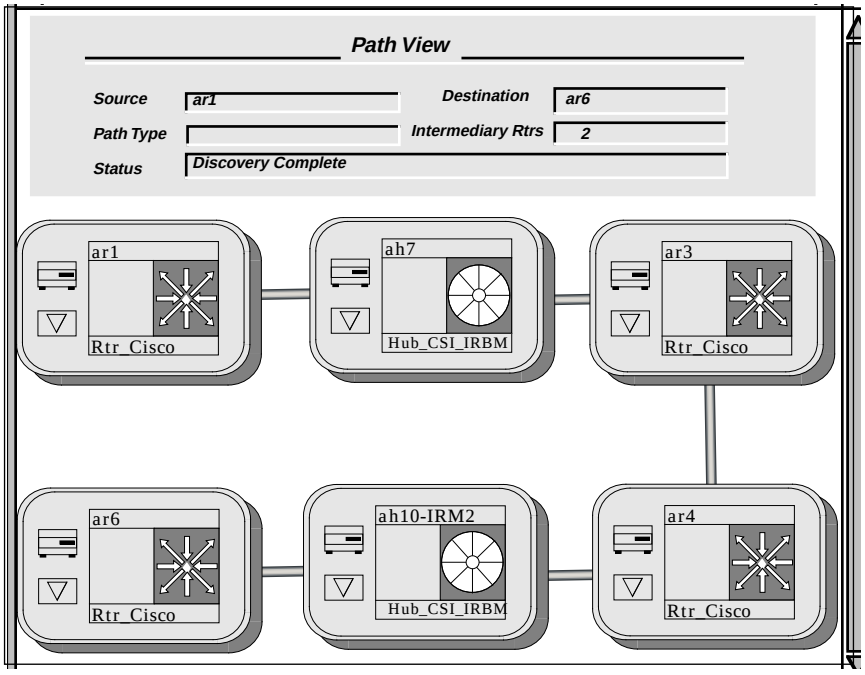
Once discovery starts, the PathView Display View initially shows only the Source router icon, and the status box displays the "Finding Routers" message. After PathView has discovered all routers and devices on the path, the message "Discovery Complete" appears. The Full Path router path displays after the "Discovery Complete" message appears.

This sample router path shows no intermediary routers between the source and destination. The path does show a Cabletron IRM2 Hub with port information; the hub is the only device found between the routers.

Full Discovery in Compact Layout/Show Ports Off

Figure 3-3 shows a Full Path router path showing all routers and devices, displaying in Compact Layout with Show Port Icons off.

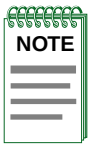
Figure 3-3. Full Path Router Path in Compact Layout with Show Ports Off



Launching the Router Path

You can launch the router path from the SPECTRUM Topology View **View** pulldown menu. The Find Address option searches for a model by model type to obtain the source and destination addresses. To initiate this process and filter the model type list, follow these steps to replicate this router path.

1. Select **PathView** from Applications under the View menu. The PathView Control View appears.
2. Click the **Find Address** button below the Source Address field. The Find Address dialog box appears.
3. Click the **Model Type** button; the Select Model Type information view appears.
4. Enter the desired string in the Filter field. This action filters the Select Model Type list to those model type names matching the filter string, and highlights the appropriate model type name. The Figure 3-2 sample router string is rtr_cis, and corresponds with the Cisco router model type entry.



You may type the filter string information in uppercase or lowercase; the filter is case-insensitive.

5. Click **OK** within the Find Address list box.
6. Click **OK** in the Find Address information view to initiate the find.

The next set of steps in the launching procedure requires that you choose source and destination addresses. Once you click on the Find Address information view, another Select Model Type list box appears showing all Rtr_Cisco models.

To select the appropriate model type, follow the steps listed below.

1. Select the model of choice (sample model is ar1) and start PathView from Utilities**.** The model's IP address appears in the SPECTRUM PathView window's Source Address field.
2. Click Find Address under Destination Address to find the destination. The Find Address information view displays Model Name and Model Type.
3. Enter the destination model name, if known. In the Figure 3-3 sample, the model name is "ar6", and is entered in the Model Name field.
4. Click **OK** in the Find Address information view. The IP address for the ar6 router model displays in the Destination Address field of the PathView Control View.
5. Discover is set to **Full Path** and layout is **Compact**.
6. Toggle the Show Port Icons box off.
7. Click **OK** to start the path discovery process.

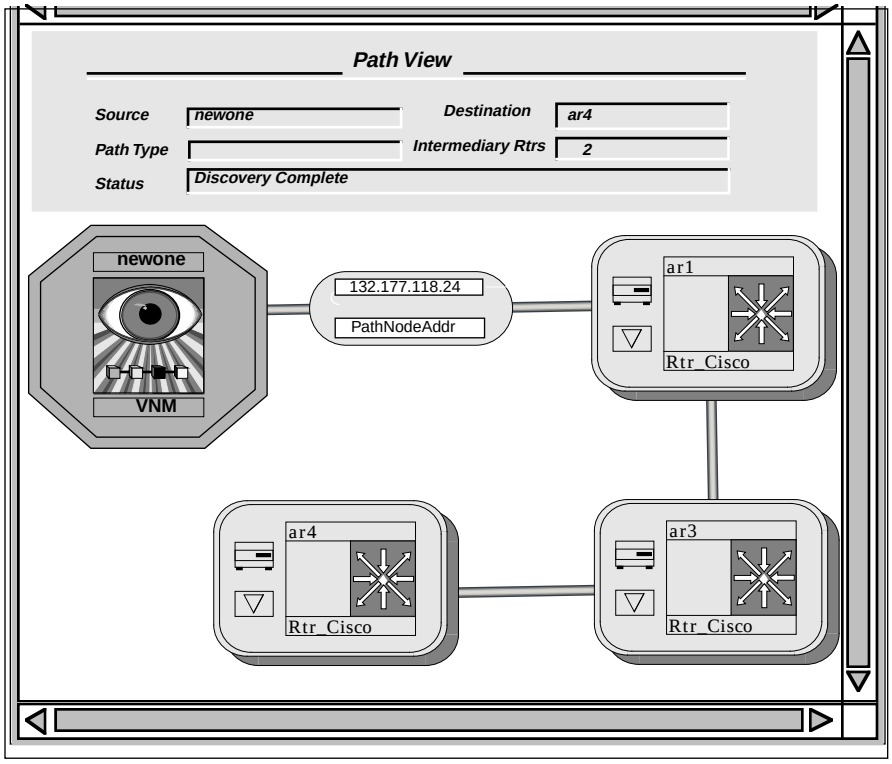
The PathView Display View initially displays only the source router, and a PathView status of "Finding routers". Once discovery is complete, the final path in Figure 3-4 displays two intermediary routers between the source and destination, and shows the intra-router devices discovered. The path is shown in Compact layout with no port information shown.

Once discovery starts, the PathView Display View initially shows only the Source router icon, and the status box displays the "Finding Routers" message. After PathView has discovered all routers on the path, the message "Discovery Complete" appears, and the Full Path router path appears.

Routers Only in Compact Layout/Show Ports Off

Figure 3-4 illustrates a PathView router path showing routers only, displaying in Compact Layout with Show Port Icons off.

Figure 3-4. Routers Only Router Path in Compact with Show Port Icons Off



The figure shows the path between the network management station “aslan” and a network router “ar4”. You should follow these steps to display a similar router path:

1. Press the middle mouse button from anywhere inside a SPECTRUM Topology View to launch PathView.
2. Select **PathView** from the Utilities menu selection. The PathView Control View appears.
3. Enter the IP address for the network management station from which the VNM is running.
4. In Edit mode, click **Select All** to select all Topology View models.
5. **Copy** the models to the Destination Address clipboard.

6. Click the SPECTRUM PathView **Clipboard** button directly below the Destination Address field. A list box showing all clipboard models appears.
7. Select the model "ar4" from the list and press **OK**. The Destination Address field now displays the IP address for the ar4 model.
8. Select **Routers Only**.
9. Select **OK** after you have confirmed the Layout option is **Compact** and **Show Port Icons** is disabled.

Once discovery starts, the PathView Display View initially shows only the Source router icon, and the status box displays the "Finding Routers" message. After PathView has discovered all routers on the path, the message "Discovery Complete" appears. The Routers Only router path displays after the "Discovery Complete" message appears.

Three intermediary routers between the source and destination display in the PathView Display View. The PathNodeAddr model represents the first discovered router not modeled; the other routers in the path are shown. The router path is shown in Compact Layout with no port information displayed.

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